

WHAT IS CLAIMED IS:

1 1. A receiver comprising:
2 an equalizer;
3 a decoder arranged to decode data from a signal,
4 wherein the signal is based upon an output of the equalizer;
5 an encoder arranged to re-encode the decoded data;
6 an error generator arranged to generate an error
7 based upon the signal and the re-encoded data and to weight
8 the error according to a reliability that the decoder
9 accurately decoded the data from the signal; and,
10 a controller arranged to control the equalizer in
11 response to the weighted error.

1 2. The receiver of claim 1 wherein the re-
2 encoded data correspond to a plurality of first data
3 elements, wherein a first portion of the first data elements
4 designates a sign, wherein a second portion of the first
5 data elements designates a plurality of second data
6 elements, wherein a third portion of the first data elements
7 designates a plurality of third data elements, wherein the
8 encoder supplies an output, and wherein the output of the

9 encoder includes a plurality of fourth data elements derived
10 from the sign and the second and third data elements.

1 3. The receiver of claim 2 wherein the fourth
2 data elements are derived by multiplying the second and
3 third data elements and by applying the sign to a result of
4 the multiplication.

1 4. The receiver of claim 2 wherein the second
2 data elements correspond to a coset leader, and wherein the
3 third data elements correspond to a Walsh function.

1 5. The receiver of claim 4 wherein the fourth
2 data elements are derived by multiplying the second and
3 third data elements and by applying the sign to a result of
4 the multiplication.

1 6. The receiver of claim 1 wherein the decoder
2 performs a Walsh transform.

1 7. The receiver of claim 1 wherein the signal
2 includes a code vector, wherein the code vector is one of a
3 plurality of code vectors divided into cosets, and wherein
4 the decoder correlates the code vector with a coset leader
5 uniquely corresponding to each coset.

1 8. The receiver of claim 7 wherein the re-
2 encoded data correspond to a plurality of first data
3 elements, wherein a first portion of the first data elements
4 designates a sign, wherein a second portion of the first
5 data elements designates a plurality of second data elements
6 corresponding to one of the coset leaders, wherein a third
7 portion of the first data elements designates a plurality of
8 third data elements, wherein the encoder supplies an output,
9 and wherein the output of the encoder includes a plurality
10 of fourth data elements derived from the sign and the second
11 and third data elements.

1 9. The receiver of claim 8 wherein the fourth
2 data elements are derived by vector multiplying the second
3 and third data elements and by applying the sign to a result
4 of the multiplication.

1 10. The receiver of claim 9 wherein the decoder
2 performs Walsh transforms, and wherein the third data
3 elements correspond to a Walsh function.

1 11. The receiver of claim 7 wherein the code
2 vector is a Kerdock code vector.

1 12. The receiver of claim 1 wherein the decoder
2 produces correlation peaks from the signal and references.

1 13. The receiver of claim 12 wherein the
2 reliability is based upon a largest one of the correlation
3 peaks.

1 14. The receiver of claim 12 wherein the
2 reliability is based upon a comparison between a square of a
3 correlation peak having the largest magnitude and a square
4 of a correlation peak having the next largest magnitude.

1 15. The receiver of claim 12 wherein the
2 reliability is based upon a comparison between a correlation
3 peak having the largest magnitude and a correlation peak
4 having the next largest magnitude.

1 16. The receiver of claim 15 wherein the signal
2 includes a code vector, wherein the code vector is one of a
3 plurality of code vectors divided into cosets, and wherein
4 the references are coset leaders uniquely corresponding to
5 the cosets.

1 17. The receiver of claim 16 wherein the decoder
2 multiplies the signal by the coset leaders, and wherein the
3 decoder performs corresponding Walsh transforms on results
4 of the multiplications.

1 18. The receiver of claim 16 wherein the re-
2 encoded data correspond to a plurality of first data
3 elements, wherein a first portion of the first data elements
4 designates a sign, wherein a second portion of the first
5 data elements designates a plurality of second data elements
6 corresponding to one of the coset leaders, wherein a third

7 portion of the first data elements designates a plurality of
8 third data elements, wherein the encoder supplies an output,
9 and wherein the output of the encoder includes a plurality
10 of fourth data elements derived from the sign and the second
11 and third data elements.

1 19. The receiver of claim 18 wherein the fourth
2 data elements are derived by vector multiplying the second
3 and third data elements and by applying the sign to a result
4 of the multiplication.

1 20. The receiver of claim 19 wherein the decoder
2 performs Walsh transforms, and wherein the third data
3 elements correspond to a Walsh function.

1 21. The receiver of claim 16 wherein the code
2 vector is a Kerdock code vector.

1 22. The receiver of claim 1 wherein the
2 controller is an LMS adaptive controller.

1 23. The receiver of claim 1 wherein the decoder
2 produces a soft output comprising data and a reliability
3 factor.

1 24. An electrical signal representing a plurality
2 of first data elements, wherein a first portion of the first
3 data elements designates a sign, wherein a second portion of
4 the first data elements designates a plurality of second
5 data elements, wherein a third portion of the first data
6 elements designates a plurality of third data elements, and
7 wherein the electrical signal includes a plurality of fourth
8 data elements derived from the sign and the second and third
9 data elements.

1 25. The electrical signal of claim 24 wherein the
2 fourth data elements are derived by multiplying the second
3 and third data elements and by applying the sign to a result
4 of the multiplication.

1 26. The electrical signal of claim 24 wherein the
2 second data elements correspond to a coset leader, and
3 wherein the third data elements correspond to a Walsh
4 function.

1 27. The electrical signal of claim 26 wherein the
2 fourth data elements are derived by multiplying the second
3 and third data elements and by applying the sign to a result
4 of the multiplication.

1 28. The electrical signal of claim 24 wherein the
2 fourth data elements comprise a code vector.

1 29. The electrical signal of claim 28 wherein the
2 code vector is one of a plurality of code vectors divided
3 into cosets, and wherein each coset has a coset leader
4 uniquely corresponding to its coset.

1 30. The electrical signal of claim 29 wherein the
2 fourth data elements are derived by vector multiplying the
3 second and third data elements and by applying the sign to a
4 result of the multiplication.

1 31. The electrical signal of claim 29 wherein the
2 second data elements correspond to one of the coset leaders,
3 and wherein the third data elements correspond to a Walsh
4 function.

1 32. The electrical signal of claim 31 wherein the
2 fourth data elements are derived by vector multiplying the
3 second and third data elements and by applying the sign to a
4 result of the multiplication.

1 33. The electrical signal of claim 32 wherein the
2 code vector is a Kerdock code vector.

1 34. A method comprising:
2 decoding data from a data signal, wherein the data
3 signal is based upon an output of an equalizer;
4 re-encoding the decoded data;
5 providing a feedback signal based upon the data
6 signal, the re-encoded data, and a reliability that the
7 decoding of the data from the data signal is performed
8 accurately; and,

9 controlling the equalizer in response to the
10 feedback signal.

1 35. The method of claim 34 wherein the decoding
2 of data from the data signal comprises re-encoding the
3 decoded data according to first, second, and third portions
4 of the decoded data, wherein the first portion designates a
5 sign, wherein the second portion designates first data, and
6 wherein the third portion designates second data.

1 36. The method of claim 35 wherein the decoding
2 of data from the data signal comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.

1 37. The method of claim 35 wherein the first data
2 correspond to a coset leader, and wherein the second data
3 correspond to a Walsh function.

1 38. The method of claim 37 wherein the decoding
2 of data from the data signal comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.

1 39. The method of claim 34 wherein the decoding
2 of data from the data signal comprises applying a Walsh
3 transform to the data signal.

1 40. The method of claim 34 wherein the data
2 signal includes a received code vector.

1 41. The method of claim 40 wherein the received
2 code vector is one of a plurality of code vectors divided
3 into cosets, and wherein the decoding of data from the data
4 signal comprises multiplying the received code vector by a
5 coset leader uniquely corresponding to each coset.

1 42. The method of claim 41 wherein the re-
2 encoding of the decoded data comprises re-encoding the
3 decoded data according to first, second, and third portions
4 of the decoded data, wherein the first portion designates a

5 sign, wherein the second portion designates first data, and
6 wherein the third portion designates second data.

1 43. The method of claim 42 wherein the re-
2 encoding of the decoded data comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.

1 44. The method of claim 42 wherein the first data
2 correspond to one of the coset leaders, and wherein the
3 second data correspond to a Walsh function.

1 45. The method of claim 44 wherein the re-
2 encoding of the decoded data comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.

1 46. The method of claim 45 wherein the
2 multiplying of the first and second data comprises vector
3 multiplying the first and second data.

1 47. The method of claim 41 wherein the decoding
2 of data from the data signal comprises performing Walsh
3 transforms, and wherein the second data correspond to a
4 Walsh function.

1 48. The method of claim 40 wherein the code
2 vector is a Kerdock code vector.

1 49. The method of claim 34 wherein the decoding
2 of data from the data signal comprises correlating the data
3 signal with references to generate correlation peaks.

1 50. The method of claim 49 wherein the decoding
2 of data from the data signal comprises determining the data
3 based upon a largest correlation peak.

1 51. The method of claim 49 wherein the providing
2 of a feedback signal comprises weighting the feedback signal
3 according to a largest correlation peak.

1 52. The method of claim 49 wherein the providing
2 of a feedback signal comprises weighting the feedback signal
3 according to a comparison of a largest correlation peak to a
4 next largest correlation peak.

1 53. The method of claim 49 wherein the providing
2 of a feedback signal comprises weighting the feedback signal
3 according to a comparison of a square of a largest
4 correlation peak to a square of a next largest correlation
5 peak.

1 54. The method of claim 49 wherein the data
2 signal includes a code vector, wherein the code vector is
3 one of a plurality of code vectors divided into cosets, and
4 wherein the correlating of the data signal with references
5 comprises multiplying the received code vector by a coset
6 leader uniquely corresponding to each coset.

1 55. The method of claim 54 wherein the
2 correlating of the data signal with references comprises
3 performing Walsh transforms on results of multiplying the
4 received code vector by a coset leader uniquely corre-

5 sponding to each coset, and wherein the second data
6 correspond to a Walsh function.

1 56. The method of claim 54 wherein the re-
2 encoding of the decoded data comprises re-encoding the
3 decoded data according to first, second, and third portions
4 of the decoded data, wherein the first portion designates a
5 sign, wherein the second portion designates first data, and
6 wherein the third portion designates second data.

1 57. The method of claim 56 wherein the re-
2 encoding of the decoded data comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.

1 58. The method of claim 56 wherein the first data
2 correspond to a coset leader, and wherein the second data
3 correspond to a Walsh function.

1 59. The method of claim 58 wherein the re-
2 encoding of the decoded data comprises multiplying the first
3 and second data and applying the sign to a result of the
4 multiplication.